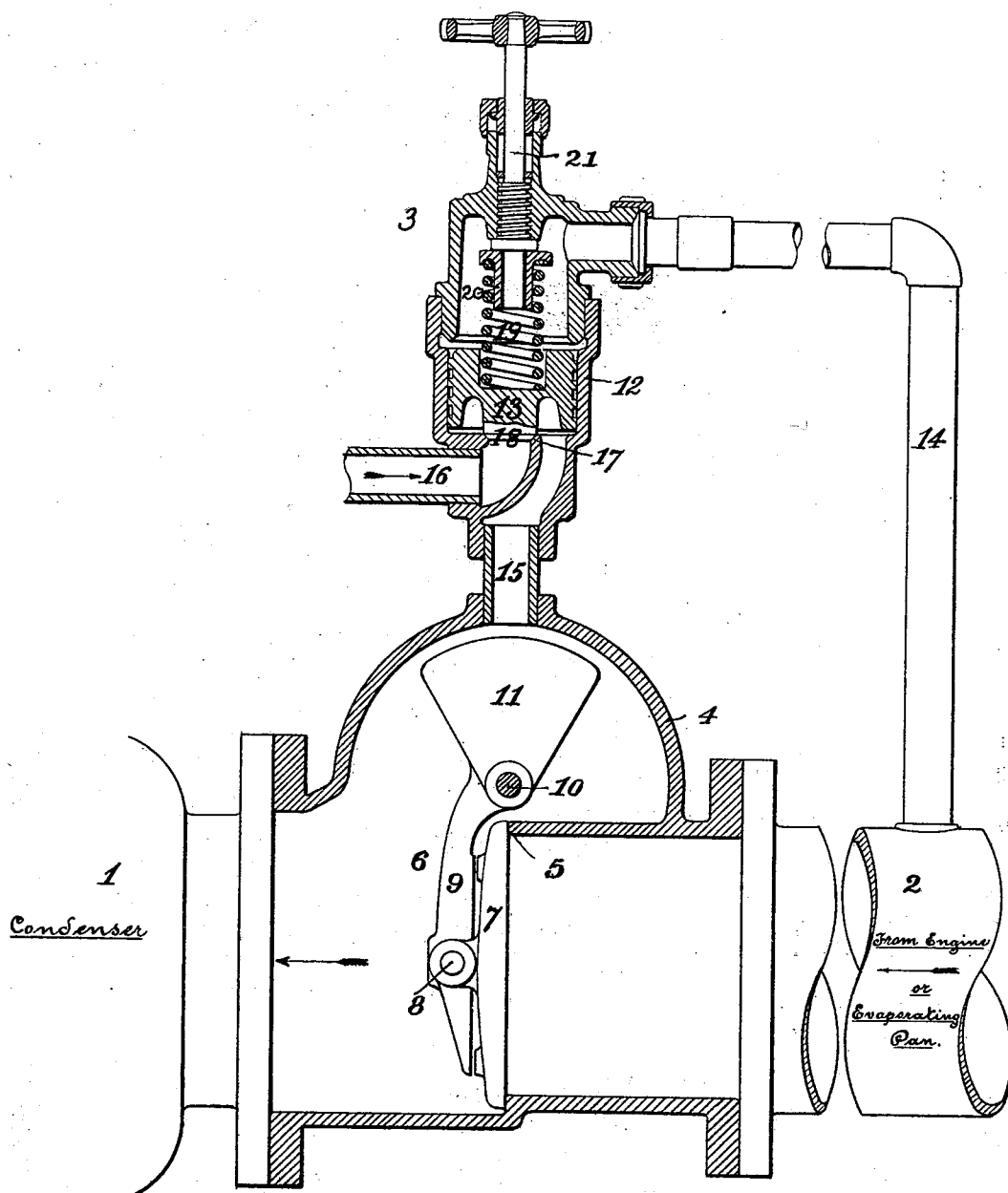


(No Model.)

L. SCHUTTE.
APPARATUS FOR PREVENTING THE BACK FLOW OF WATER
FROM CONDENSERS.

No. 508,246.

Patented Nov. 7, 1893.



Witnesses
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UNITED STATES PATENT OFFICE.

LOUIS SCHUTTE, OF PHILADELPHIA, PENNSYLVANIA.

APPARATUS FOR PREVENTING THE BACKFLOW OF WATER FROM CONDENSERS.

SPECIFICATION forming part of Letters Patent No. 508,246, dated November 7, 1893.

Application filed April 22, 1893. Serial No. 471,508. (No model.)

To all whom it may concern:

Be it known that I, LOUIS SCHUTTE, of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Preventing the Backflow of Water from Condensers, of which the following is a specification.

In the employment of apparatus for condensing exhaust steam from engines, pumps or equivalent devices, great trouble and annoyance have been caused by reason of the back flow of the water from the condenser to the engine, when the discharge action of the former has from any cause been interrupted, and before the condenser can resume its proper action, the discharge of this water must be effected. My invention is designed to overcome this trouble and the delay caused by the interruption of the discharge from the condenser, by first providing for the immediate and automatic discharge of the water, so as to enable the condenser to instantly resume its functions, and incidentally to positively check the back flow of the water.

With these ends in view my invention consists primarily of a mechanism controlled in its action by the exhaust steam and constructed to destroy the vacuum in the condenser when the discharge of the latter is interrupted, by admitting atmospheric air or air under pressure to the condenser. This will act to positively discharge the accumulated water, and permit the condenser to immediately resume its functions.

The invention also consists in employing in connection with the mechanism described above, a check valve or equivalent device located within the passage for the exhaust steam and arranged to close the same and prevent the back flow of the water, when the action of the condenser is stopped, but to admit of the free passage of the exhaust steam when the condenser resumes its operation.

My invention also consists in the details of construction and combination of parts hereinafter described and claimed.

In the accompanying drawing I have represented in connection with the mechanism for automatically admitting air to the condenser when the operation of the latter is interrupted, a check valve to prevent the back

flow of water to the engine, but it is to be understood that this valve may be dispensed with and dependence placed upon the instantaneous action of the air admitting mechanism to discharge the water before it has had time to reach a point where injury can result, as will be more fully described hereinafter.

The figure represents in sectional elevation a view of my improved mechanism applied to the exhaust passage between the engine and the condenser.

1 represents a condenser, 2 an exhaust pipe leading from the engine, pump or other source of exhaust steam to be condensed, and 3 a valve mechanism adapted to be controlled by the exhaust steam to admit atmospheric air to the condenser.

In carrying my invention into effect I locate in the exhaust steam pipe between the engine and the condenser a chamber or casing 4, provided with a valve seat 5, which is closed by a check valve 6, opening toward the condenser. The valve proper of this check valve comprises a disk 7, which is arranged in a vertical position within the chamber and pivoted on a horizontal axis 8, to a vertical arm 9, which is in turn pivoted on a horizontal axis 10, fixed within the chamber. This arm is provided with a counter weight 11, which is so proportioned with respect to the weight of the valve and the location of the pivot on which the arm turns, that the valve will close when the pressure on its opposite sides is equal or when the pressure is higher on the side of the valve nearest the condenser. It will be seen from this construction that in the event of an interruption in the discharge of the water, the valve will immediately close and prevent the back flow of the water to the engine. It will also be seen that before the condenser can resume its action, this water must be discharged by allowing the exhaust steam to reach atmospheric pressure or some pressure sufficient to force out the water. To accomplish this a delay will be caused, and to limit this delay to the least possible period so that the condenser may resume its action as soon as possible, I provide for the admission of atmospheric air to the condenser by the valve mech-

anism 3 before alluded to. This valve mechanism consists of a casing or cylinder 12, containing a piston or diaphragm 13. The cylinder on the upper side of the piston communicates with the exhaust steam pipe through a pipe 14, and on the opposite side of the piston the cylinder communicates with the chamber 4 containing the check valve through a passage 15. This passage is in communication also with the external air through a passage 16, which is provided with a valve seat 17, adapted to be closed by a valve 18 formed on the under side of the piston or diaphragm, as plainly shown. From this it will be seen that when the piston is raised, the valve on the under side will leave its seat, so that atmospheric air may enter through the passage 16 to chamber 4, and thence to the condenser.

The piston or diaphragm 13 is acted on from above by a spiral spring 19, having its lower end seated in a socket in the upper side of the piston, and its upper end bearing against a flange projecting from the sleeve 20, loosely encircling the lower end of a vertical rod 21, which is threaded and screwed through the top of the casing. This spring is for the purpose of resisting the tendency of the atmospheric air to raise the piston, and its valve and by adjusting the tension of the spring, its action may be varied according to the variations of the conditions encountered in practice.

The operation of the device is as follows:— Assuming that the condenser is operating properly, the check valve will be opened admitting the exhaust steam, and the valve 18 will be closed. If now, the discharge of the condenser is for any cause interrupted, the vacuum on the condenser side of the check valve will be lowered, and the check valve will at once close, by reason of the inequality of pressure on opposite sides thus effectually preventing the back flow of the water to the engine. The vacuum on the engine side of the valve being maintained, and that on the condenser side being lowered the inequality of pressure on the upper and lower sides of the piston 13 will raise the latter, with its valve 18 and open the communication to the atmospheric air. The air will enter through passages 16 and 15 to chamber 4 and from thence to the condenser, and will discharge the accumulated water by atmospheric pressure. The interruption will be only momentary, and as soon as the condenser resumes its operation the vacuum on that side of the check valve will again be restored, the pressure will be equalized on opposite sides of the valve, the valve 18 will be closed by the action of its spring, and the apparatus will resume its regular operation.

It will be noted that the action of the device is automatic, and that but little delay will be caused when the action of the condenser is interrupted, in discharging the accumulated water, and enabling the action of the condenser to be resumed.

As before stated, the check valve may be dispensed with and dependence placed on the valve in the air admitting mechanism to cause the discharge of water before it has had time to flow back to the engine. In such cases it will be necessary to adjust the spring so that the piston will respond quickly to slight variations in pressure, and also to omit the chamber 4, the passage 15 being connected directly to the condenser, and the pipe 14 with the exhaust pipe adjacent to the engine or other source of exhaust steam.

Having thus described my invention, what I claim is—

1. In combination with a condenser and an exhaust steam pipe leading thereto, a check valve in said pipe to prevent back-flow, an air inlet on the condenser side of said valve, and a valve controlling said inlet and adapted to be operated by inequality of pressure on opposite sides of said check-valve to admit air to the condenser when the discharge action of the latter ceases.

2. In combination with a condenser and an exhaust steam pipe leading thereto, a casing, a piston located therein and dividing the same into two chambers, one of said chambers being in communication with the exhaust steam pipe and the other in communication with the condenser and the external air, and a valve governed by the movement of the piston and adapted to control the admission of the air.

3. In combination with a condenser and an exhaust steam pipe leading thereto a casing, a piston therein dividing the same into two chambers, a pipe leading from one chamber to the exhaust steam pipe, the other chamber being in communication with the condenser and with the external air, and a valve carried by the piston and arranged to control the communication with the air.

4. In combination with a condenser and an exhaust steam pipe, a casing, a piston therein dividing the same into two chambers, one of said chambers in communication with the exhaust steam pipe and the other in communication with the condenser and the external air, a valve on the piston adapted to close the communication with the air, and an adjustable spring acting on the piston and tending to close the valve.

5. In combination with a condenser and an exhaust steam pipe leading thereto and provided with a chamber, a valve located within the chamber opening in the direction of the condenser and adapted to close the communication with the exhaust steam pipe, and an apparatus controlled in its action by the exhaust steam and constructed to admit air to the chamber on the side nearest the condenser when the valve is closed.

6. In combination with a condenser and an exhaust steam pipe leading thereto and provided with a chamber, a valve seat on the exhaust steam pipe, a check valve for the same opening toward the condenser, a casing, a

piston therein dividing the same into two chambers, one of said chambers being in communication with the exhaust steam pipe and the other in communication with the air and with the condenser, and a valve operated by the piston to close the communication with the air.

In testimony whereof I hereunto set my hand, this 18th day of April, 1893, in the presence of two attesting witnesses.

LOUIS SCHUTTE.

Witnesses:

DANIEL WATSON HILDRETH,
MAURICE FRANCIS SPILLIN.